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PHOTOGRAPHIC INTELLIGENCE REPORT

DECLASS REVIEW by NIMA/DOD

PHOTOGRAPHIC AND MENSURAL COMPARISON

232001

OF THE MARK II AND MARK III GUIDELINE MISSILE

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CIA/PIR -71023

DATE FEBRUARY 1967

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PHOTOGRAPHIC AND MENSURAL COMPARISON

OF THE MARK II AND MARK III GUIDELINE MISSILE

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PHOTOGRAPHIC AND MENSURAL COMPARISON OF THE
MARK II AND MARK III GUIDELINE MISSILE

INTRODUCTION

As a result of photographic observations and related source intelligence, significant differences have been observed in the Soviet Mark II and Mark III GUIDELINE missiles.

This report presents a photographic and graphical comparison of the Mark II and Mark III missiles, as well as a detailed photographic and mensural analysis of the Mark III missile. In addition, modifications to the Mark III transporter are discussed and presented graphically.

Mensuration of the Mark III missile was accomplished by the NPTC/Technical Intelligence Division. Most linear dimensions are accurate to within ± 2 percent,

while vertical dimensions are accurate to within ± 3 percent. Any exceptions to these stated percentages will be discussed further in the text.

Due to the time and materials available, the mensuration shown for the Mark II GUIDELINE was taken from existing reports and information.

The analysis of the Mark III missile was accomplished through the use of East Berlin parade photography of May 1965, and [] photography (formerly [] photography).

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Photography of the Mark II missile was taken from various Moscow parades.

ANALYSIS

Numerous external differences can be noted in the configuration of the Mark III GUIDELINE missile from that of the Mark II GUIDELINE. Inasmuch as this report is not intended to represent a technical analysis of the Mark III GUIDELINE, these differences are merely listed, for the reader's attention, without further comment. A thorough technical analysis of this missile is currently in preparation by the Office of Scientific Intelligence, CIA.

Beginning at the forward portion of the sustainer and working toward the rear of the booster, the following changes were noted on the Mark III GUIDELINE:

1. The probe on the Mark III is longer than the observed portion of the probe on the Mark II, and appears to be fixed in that position (Figure 1).
2. A probable antenna, in the form of a dark band, is located on the ogive section, forward of the canards on the Mark III.
3. A probable antenna is located just forward of, and in line with, each sustainer wing on the Mark III (Figure 4). No antennas are present on this portion of the Mark II.
4. A probable oxidizer line 12.5 feet in length, runs along the right side of the Mark III sustainer from a point just forward of the sustainer wings to just aft of the control surfaces (Figure 2). As shown in Figures 2 and 3, this line protrudes from the missile body 0.6 feet. The degree of accuracy for this measurement cannot be determined due to the angle of the photography used for mensuration. It can be determined, however, that this line is not attached to the missile body except at either end, where it enters the sustainer. The only protrusions on the Mark II sustainer, in relatively the same location, are two small possible antennas located between the control surfaces and the sustainer wings.
5. The control surfaces and their associated locking devices have changed on the Mark III, from those on the Mark II (Figures 7 and 8). Of the four control surfaces of the Mark III, two of them (upper right and lower left) are identical. The remaining two differ in configuration from those mentioned and also differ from

each other. On the Mark III, a locking device is present with each of the four control surfaces, whereas on the Mark II the lower left control surfaces does not have a locking device associated. Also on the Mark III, wing nuts are used to secure the locking devices, and no such wing nuts are present on the Mark II.

6. A probable fuel line runs midway between the upper right and upper left control surfaces. It extends from just forward of, to just aft of, the control surfaces themselves (Figure 6).

7. One external line is located in the same position on the Mark II and the Mark III GUIDELINES. On both missiles it is located under the lower left sustainer wing (Figure 5). There is a difference, however, in the manner in which this line terminates. On the Mark III it passes directly into the sustainer at a point 2.37 feet behind the sustainer wing, while on the Mark II the line extends further aft and is joined by a smaller pipe or tube which in turn passes across the thrust structure and attaches to the booster. On the Mark III this line is 7.09 feet in length, but because of the photography used in the mensuration, this measurement can be considered accurate only to within $\pm .15$ feet.

8. Only one line connects the sustainer with the booster on the Mark III and this is located on the upper left side. It extends from a point just in front of the thrust structure, across the thrust structure, and joins the booster at a point immediately below the upper left sustainer/booster connecting lug (Figure 1).

9. On the Mark II GUIDELINE, there is an electrical connection on the upper left side of the sustainer, which connects approximately three wires to the rear of the thrust structure and to the booster. In addition there is a probable pneumatic line, which extends from a point above the upper left control fin across the thrust structure/sustainer junction aft along the booster and under the leading edge of the upper left booster fin. Neither the electrical connection nor the probable pneumatic tube described above are located on the Mark III missile.

10. There is a fairing along the bottom of the Mark III sustainer, which is 10.69 feet in length. The accuracy of this dimension is limited to $\pm .15$ feet, due

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to the photography used for the mensuration (Figure 5). A similar fairing is present along the bottom of the Mark II sustainer.

11. The thrust structure of the Mark III is slightly shorter than that of the Mark II and has been reinforced (Figure 6). The outline of a reinforcing skirt can be identified on the forward portion of the thrust structure. The thickness of this reinforcing skirt is estimated to be .002 of a foot.

12. The booster itself is primarily the same on both the Mark II and III, however there are changes in the booster fins and the nozzle (Figure 9). On the Mark II the upper left and lower right booster fins have control surfaces. Associated with these control surfaces are the activating rods which can be seen around the booster nozzle, and the probable pneumatic tube described above. No control surfaces or associated components are present on the Mark III booster fins.

13. The booster nozzle on the Mark II has a nozzle throat adjustment device, which is not present on the Mark III missile. The nozzles on each missile differ in size as well (Figures 1 and 10).

14. A difference is noted with respect to the tube, which, in the case of the Mark II, extends from the end of the probable fuel line on the lower left side of the sustainer, to the booster. On the Mark III, this tube does not extend from the corresponding location on the Mark III, and it cannot be determined whether provision has been made in the booster casing for attaching this tube.

* * *

Two apparent changes were made to the Mark II missile transporter trailer in order to accommodate the Mark III missile. One change was the addition of an arm which extends from the front of the missile support rail and supports the forward portion of the Mark III sustainer (Figure 4). The point of support is directly behind the canards. The second change to the transporter was the enlarging of the oxidizer tank located on the forward portion of the transporter (Figure 3). The tank on the Mark II transporter was approximately 1.64 feet in diameter. On the Mark III transporter, the tank is located in the same relative position, however, it is 2.36 feet in diameter and 6.99 feet in length overall. Because of the quality of the photography used in the mensuration of the Mark III transporter oxidizer tank, the accuracy is limited to ± 10 percent.

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Attache photography from East Berlin Parade of May 1965 (SECRET)

Imagery Intelligence Report USSR GUIDELINE MISSILES, 15 October 1965 (SECRET)

White Sands Missile Range, Comparative Analysis of the Soviet SA-2 Mark II and Mark III GUIDELINE Missiles, 5 August 1966

REQUIREMENT

C-816-83,408

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DOCUMENTS

US Army Imagery Interpretation Center Special Report No. 22C007465, Special

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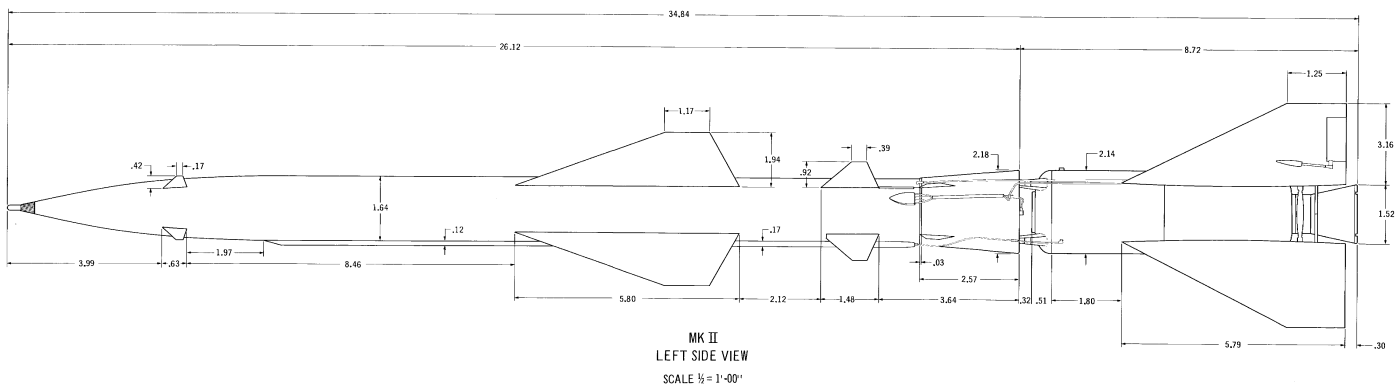
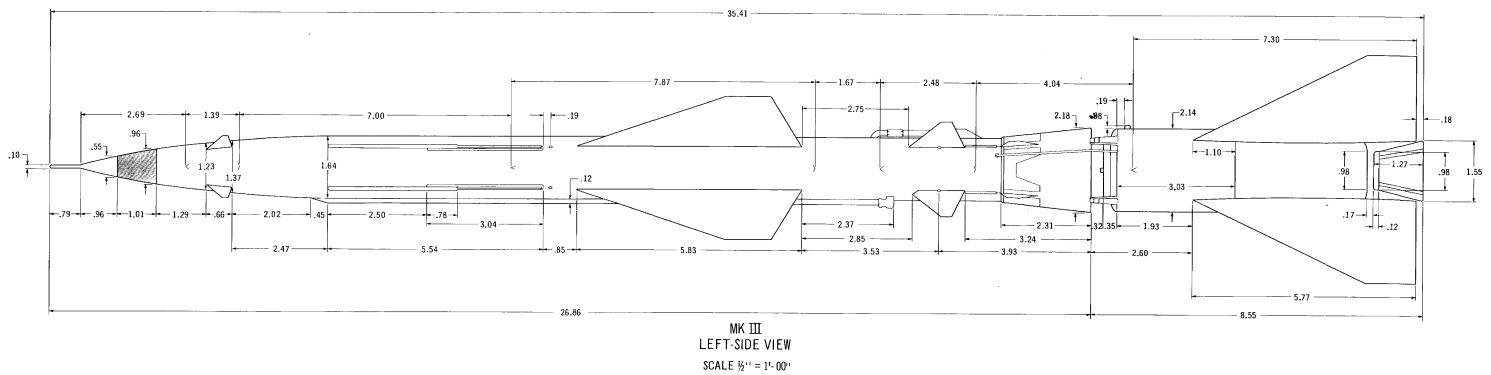
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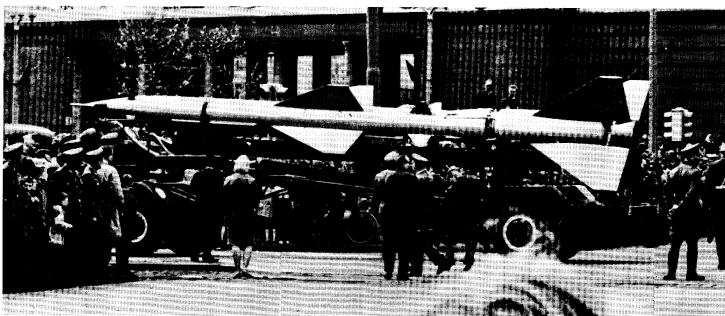
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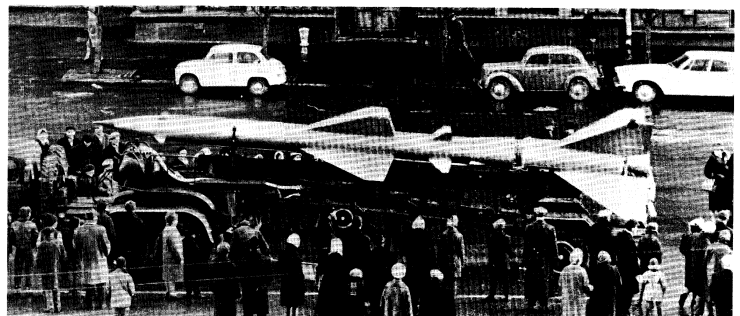
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MK III



MK II

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FIGURE 1. LEFT-SIDE VIEW COMPARISON OF THE MK III AND MK II GUIDELINE MISSILES.

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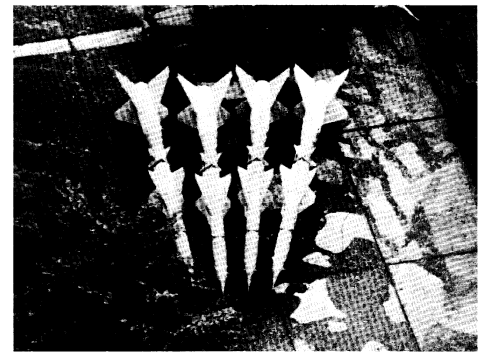
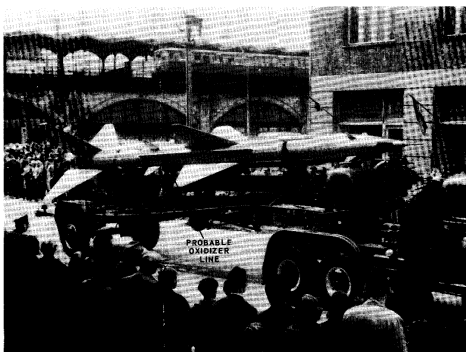
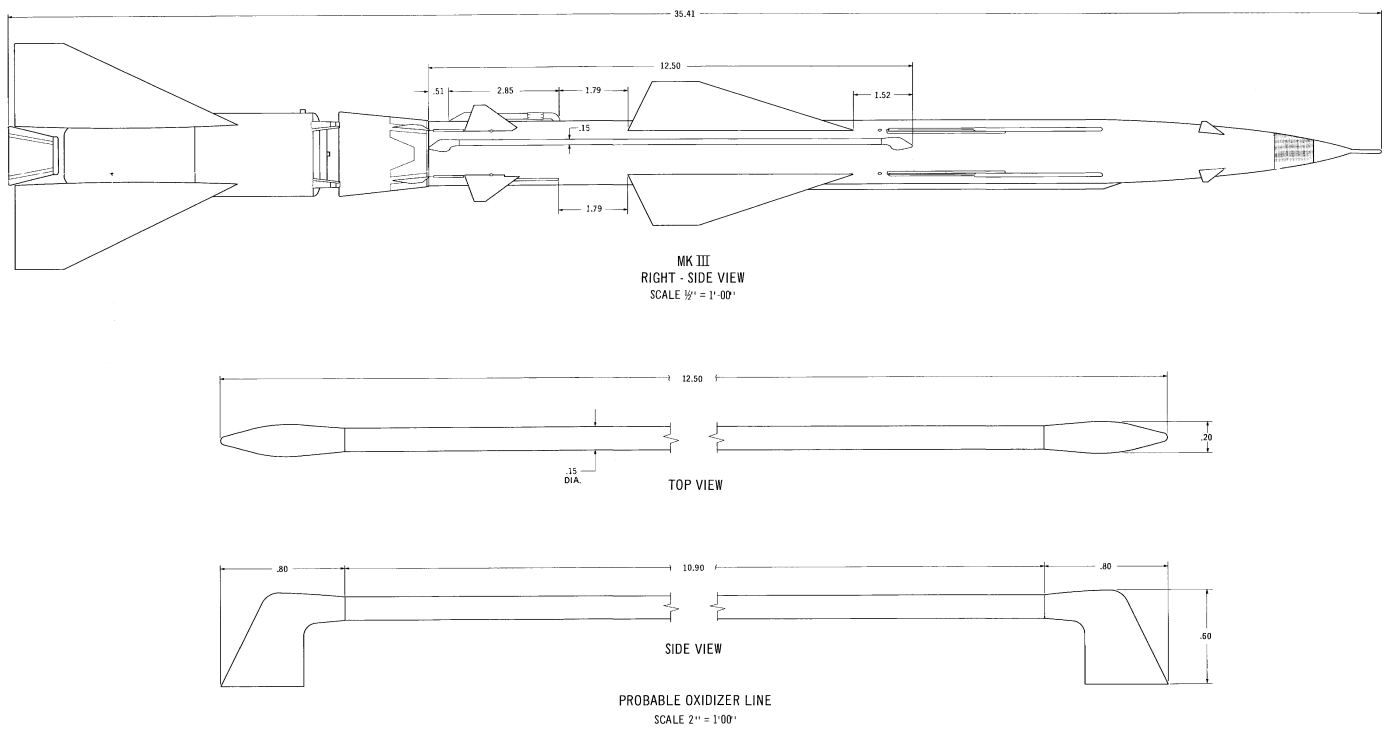
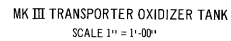
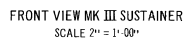


FIGURE 2. RIGHT-SIDE VIEWS OF THE MK III GUIDELINE MISSILE AND PROBABLE OXIDIZER LINE.

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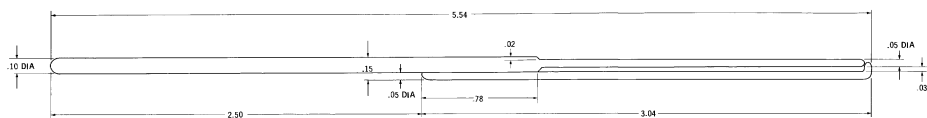
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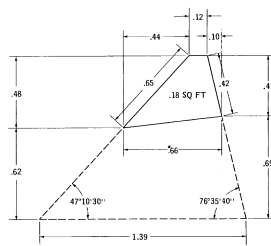
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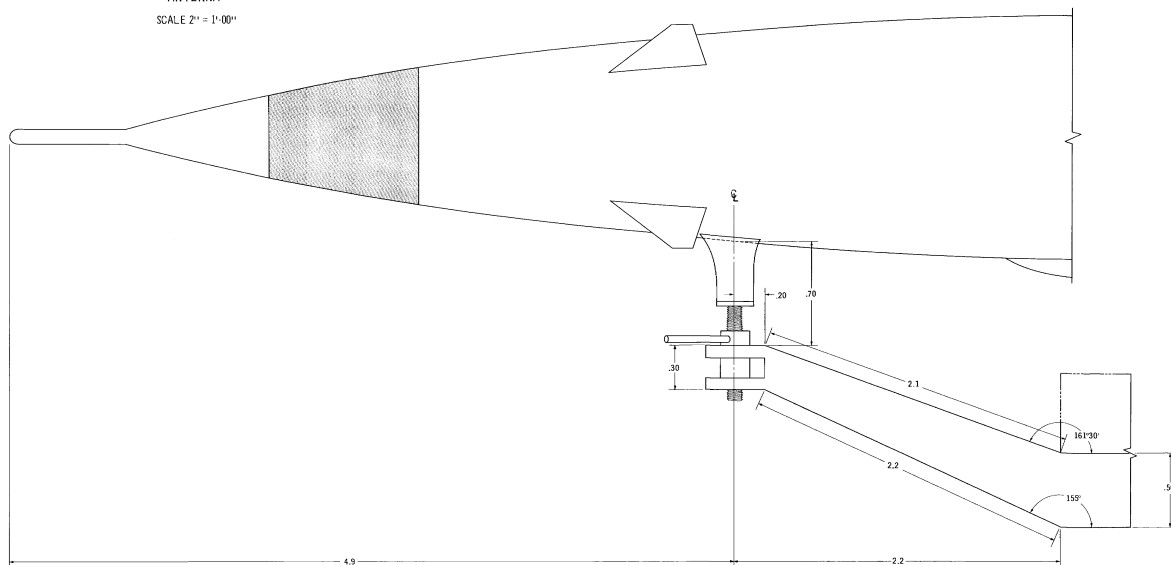
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TOP VIEW
ANTENNA
SCALE 2" = 1'-00"



CANARD
SCALE 2" = 1'-00"



MK III TRANSPORTER MISSILE SUPPORT ARM
SCALE 2" = 1'-00"

DIMENSIONS IN FEET

FIGURE 4. MK III GUIDELINE MISSILE ANTENNA, CANARD, AND TRANSPORTER MISSILE SUPPORT ARM.

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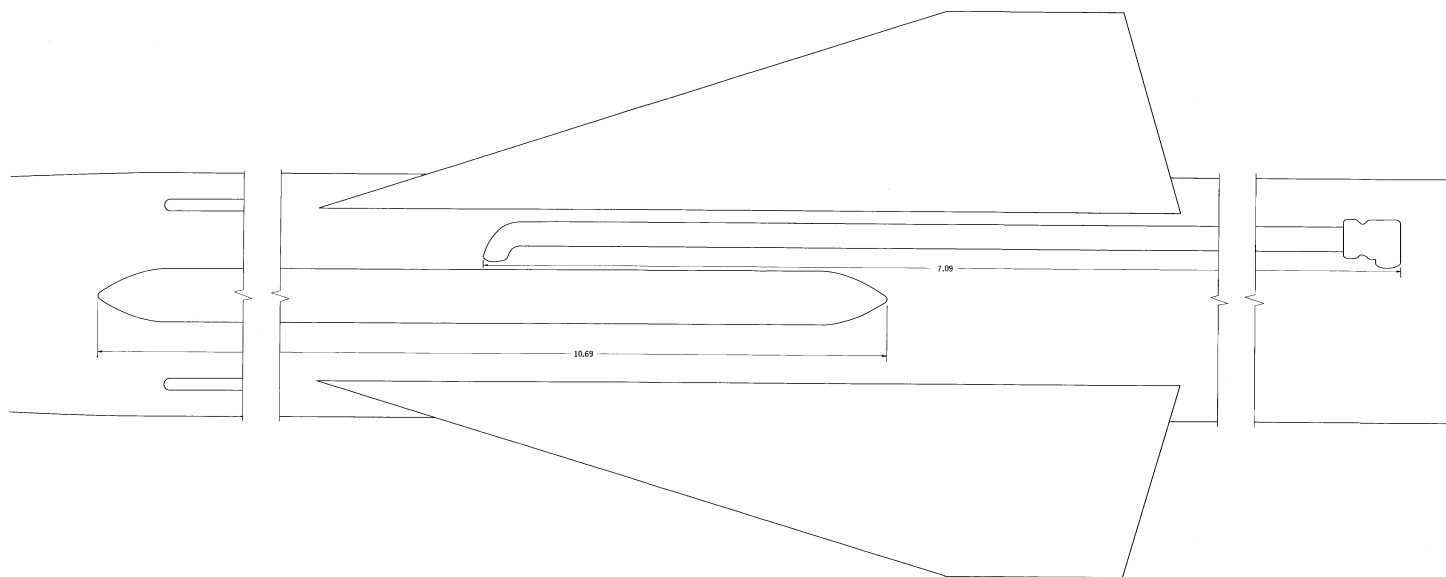
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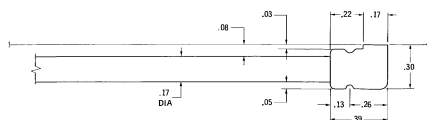
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SCALE 2" = 1'-00"

DIMENSIONS IN FEET



PROBABLE FUEL LINE LOWER LEFT

SCALE 2" = 1'-00"

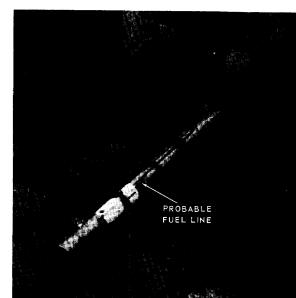
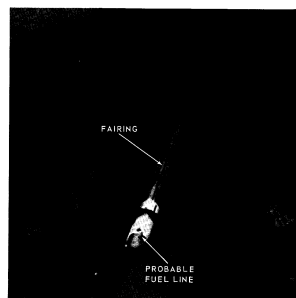
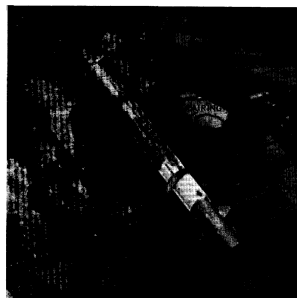


FIGURE 5. BOTTOM VIEWS OF THE MK III GUIDELINE MISSILE SUSTAINER.

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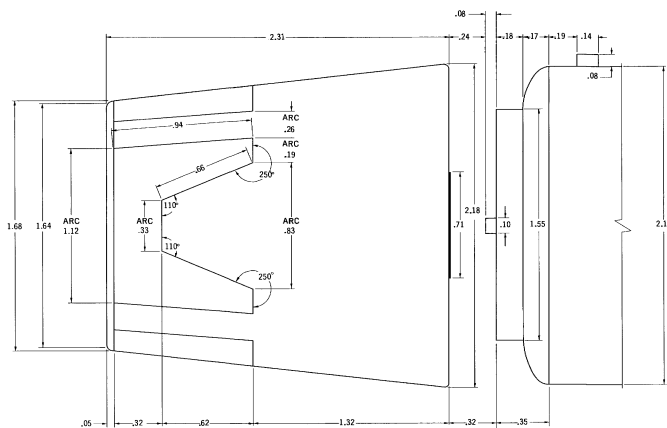
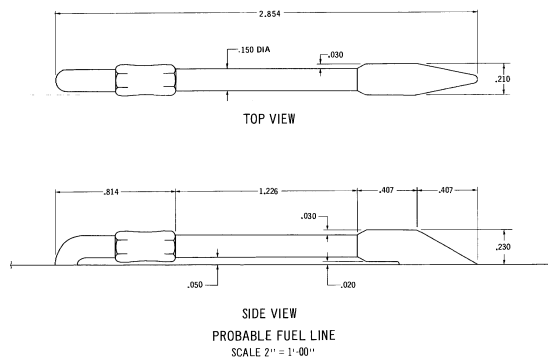
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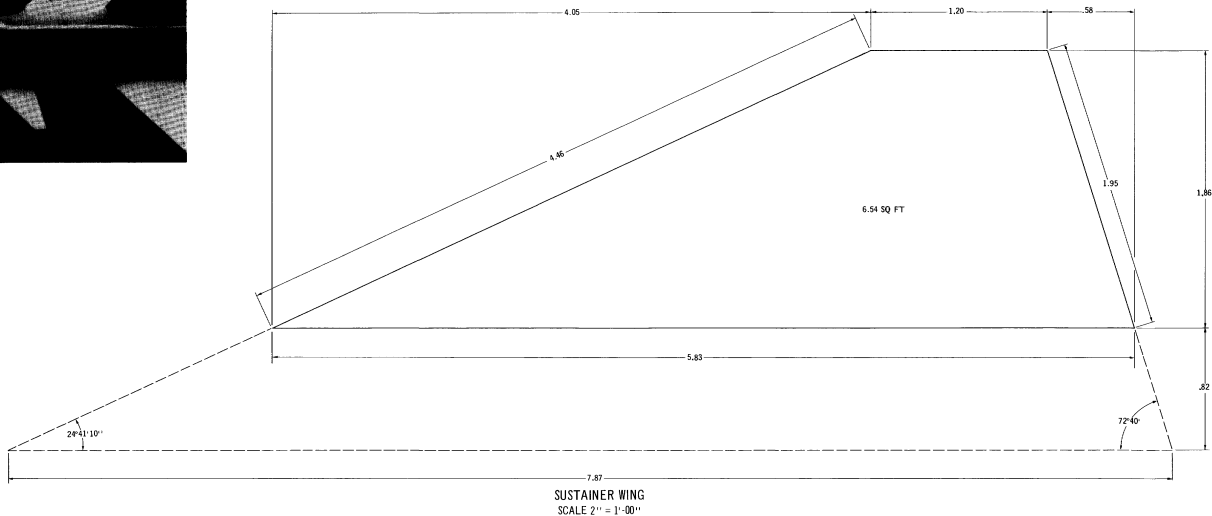
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THRUST STRUCTURE
SCALE 2" = 1'-00"



SUSTAINER WING
SCALE 2" = 1'-00"

DIMENSIONS IN FEET

FIGURE 6. MK III GUIDELINE MISSILE THRUST STRUCTURE, SUSTAINER WING, AND AFT FUEL LINE.

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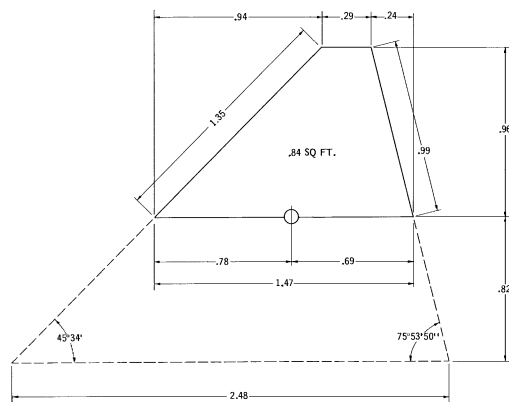
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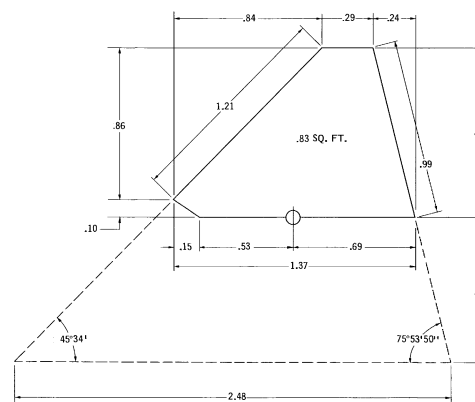
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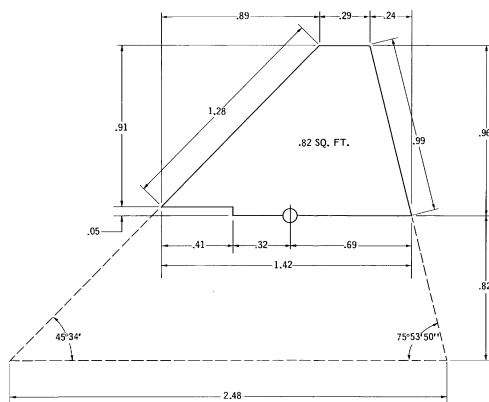
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UPPER LEFT CONTROL SURFACE
SCALE 2" = 1'-00"



UPPER RIGHT AND LOWER LEFT CONTROL SURFACES
SCALE 2" = 1'-00"



LOWER RIGHT CONTROL SURFACE
SCALE 2" = 1'-00"

DIMENSIONS IN FEET

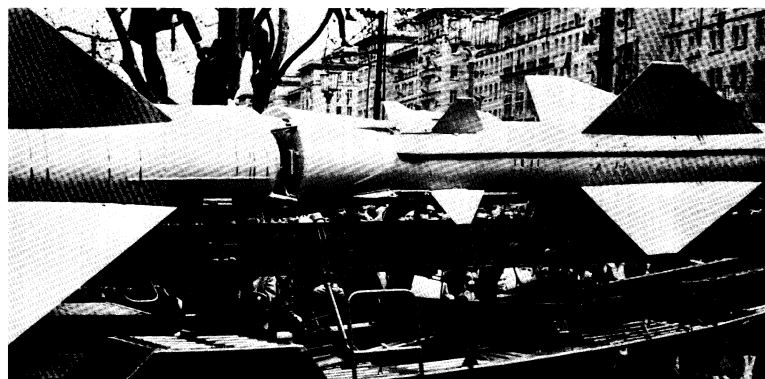


FIGURE 7. MK III GUIDELINE MISSILE CONTROL SURFACES.

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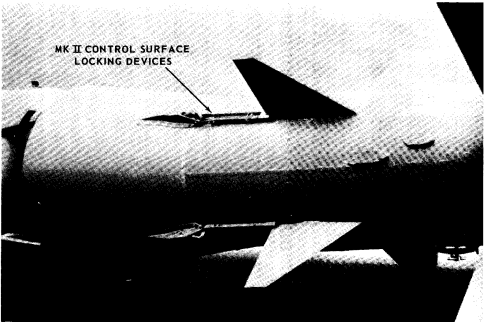
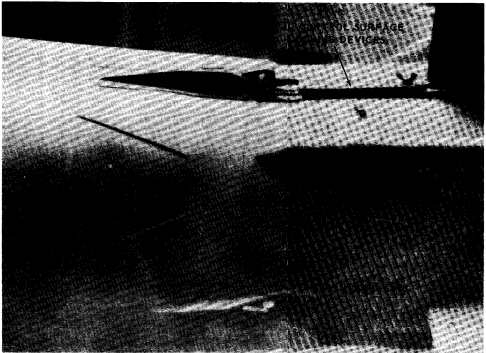
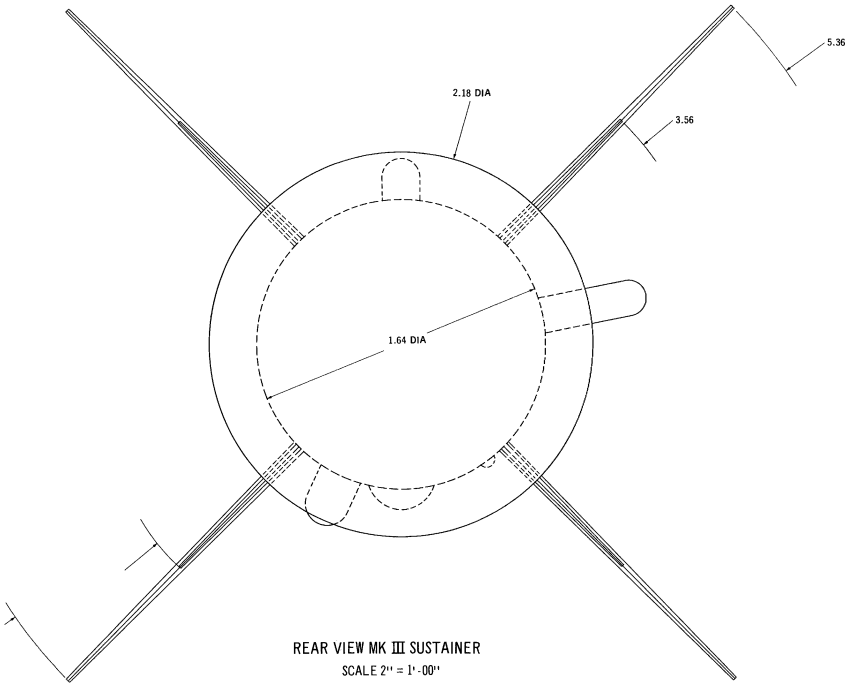
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FIGURE 8. MK III GUIDELINE MISSILE SUSTAINER AND COMPARISON OF THE MK III AND MK II CONTROL SURFACE LOCKING DEVICES.

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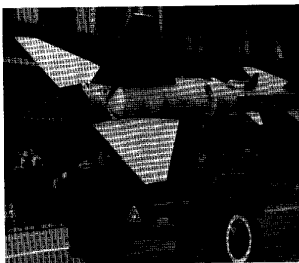
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MK III



MK II

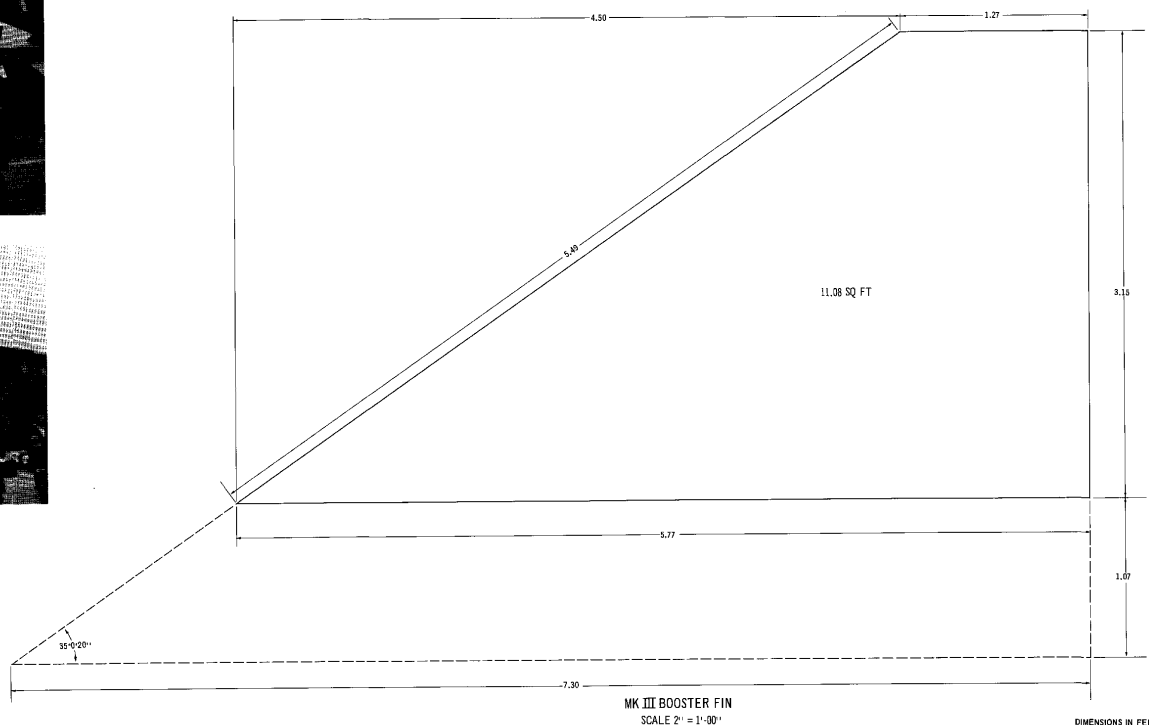


FIGURE 9. COMPARISON OF THE MK III AND MK II GUIDELINE MISSILE BOOSTERS.

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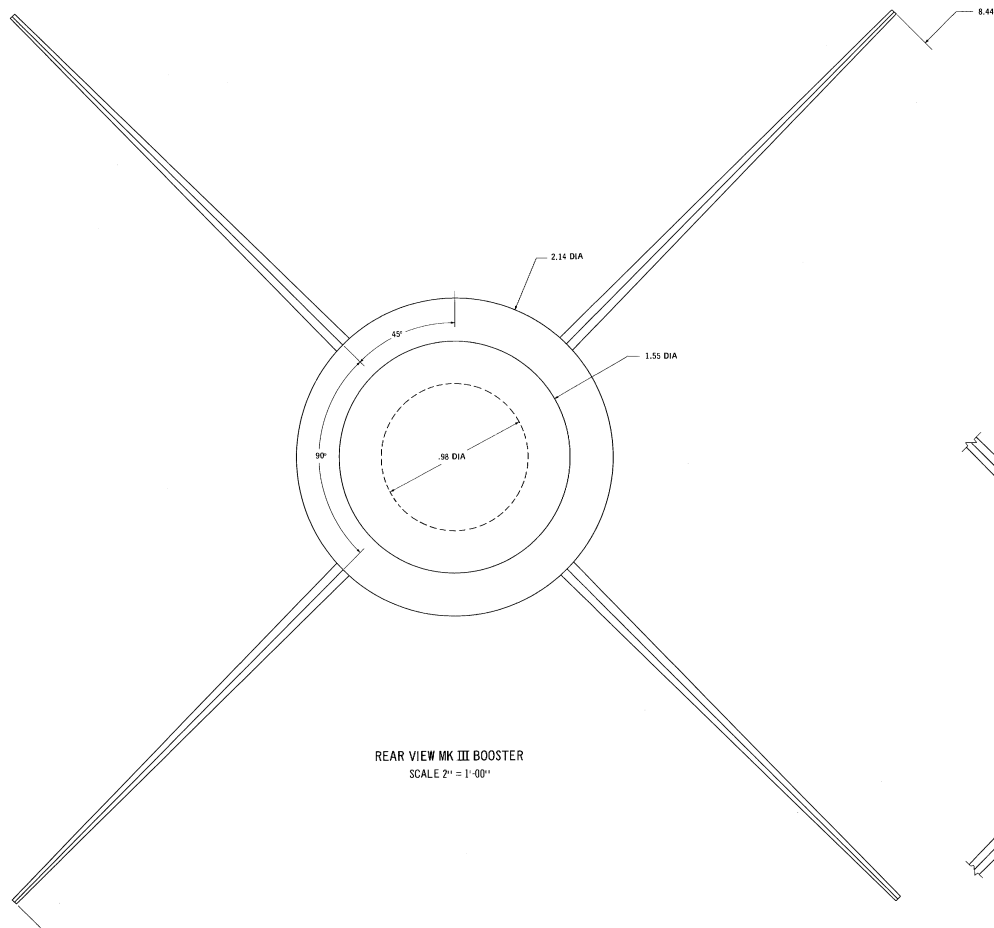
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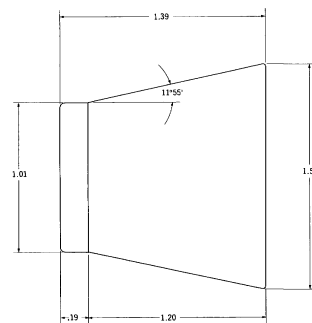
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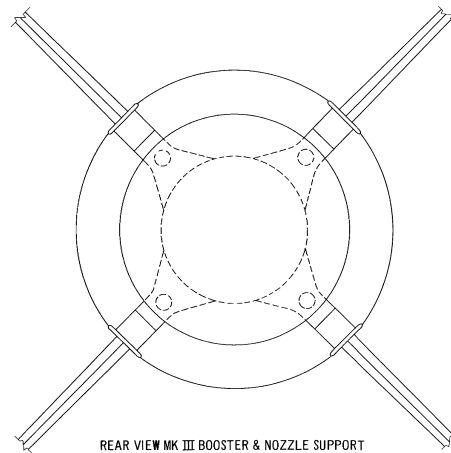
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REAR VIEW MK III BOOSTER
SCALE 2" = 1'-00"



MK II BOOSTER NOZZLE
SCALE 2" = 1'-00"



REAR VIEW MK III BOOSTER & NOZZLE SUPPORT

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FIGURE 10. MK III GUIDELINE MISSILE BOOSTER AND NOZZLE SUPPORT AND MK II BOOSTER NOZZLE.

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